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Are Electronic and Paper Questionnaires Equivalent to Assess Patients with Overactive Bladder?

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Purpose: Overactive bladder syndrome is defined as urinary urgency, usually accompanied by frequency and nocturia, with or without urgency urinary incontinence in the absence of urinary tract infection or another obvious pathological condition. Electronic questionnaires have been used in a few specialties with the hope of improving treatment outcomes and patient satisfaction. However, they have not been widely used in the urological field. When treating overactive bladder, the main outcome is to improve patient quality of life. The primary objective of this study was to evaluate whether electronic questionnaires would be equally accepted as or preferred to paper questionnaires. The secondary objective was to look at the preference in relation to patient age, education and iPad® tablet familiarity.

Materials and Methods: We prospectively evaluated the iList® electronic questionnaire application using a friendly iPad tablet in patients with overactive bladder who presented to the urology clinic at our institution. Each of the 80 patients who were recruited randomly completed the validated OABSS (Overactive Bladder Symptom Score) and the PPBC (Patient Perception of Bladder Condition) questionnaires in paper and electronic format on the tablet. Variables potentially associated with the outcomes of interest included demographic data, questionnaire method preference, patient response rate and iPad familiarity. We used the 2-sided Z-test to determine whether the proportion of patients who considered the tablet to be the same, better or much better than paper was significantly greater than 50%. The 2-sided chi-square test was applied to assess whether the intervention effect significantly differed among the demographic subgroups.

Results: A total of 80 patients 21 to 87 years old were enrolled in the study from November 2015 to August 2016. Of the patients 53% were female and 49% were 65 years or younger. The incidence of those who considered the tablet to be the same or better than paper was 82.5% (95% CI 74.2–90.8, $p < 0.001$). The incidence of patients who considered the tablet to be the same or better than paper ranged from 76% to 97% regardless of age, gender and education subgroup as well as in those with any familiarity with the tablet (each $p < 0.001$). Of the 20 patients who were not familiar with the tablet 45% preferred the electronic questionnaire ($p = 0.654$).

Conclusions: We found that the proportion of patients who considered electronic questionnaires to be equivalent to or better than paper versions was higher than those who preferred paper questionnaires regardless of age, gender or education level.

Key Words: urinary bladder, overactive; surveys and questionnaires; paper; microcomputers; patient preference

Abbreviations and Acronyms

eQ = electronic questionnaire
OAB = Overactive bladder
OABSS = OAB Symptom Score
PBBC = Patient Perception of Bladder Condition

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MEDICAL validated questionnaires are widely administered in numerous medical fields and specialties. In urology they are used extensively in all aspects from urinary incontinence and erectile dysfunction to ureteral stent pain.[1,2] Notably questionnaires are also used in the treatment of OAB, a chronic condition that affects 33 million people in the United States.[3] The PBBC[4] and the OABSS[5] are 2 validated questionnaires that are commonly used to assess severity and the response to treatment in patients with OAB. Using questionnaires to assess subjective, symptom based conditions is important to assess the impact on health related quality of life, patient symptoms and the patient response to treatment.[6]

In the last decade the surge in modern technology has contributed to electronic applications becoming more frequently applied in clinical settings. Tablets and smart phones are generally used across many age groups[7] and prior experience is not a requirement for use.[8] Smartphone use is expected to reach 5.6 billion by 2019.[9] Electronic devices such as touchscreen tablets are finding their way into hospitals for many purposes, such as research and collecting patient reported outcomes.[10,11]

Previously these items were documented by paper questionnaires but the use of eQs over paper questionnaires is well documented. Benefits include ease of use, immediate electronic storage of results and automatic scoring, avoidance of secondary data entry errors and easier followup of patient records with time. In addition, there has been positive feedback for eQs applied for informed consent procedures to assess quality of life, medical education, interventions, diagnostics and questionnaire completion.[12–14]

According to the ISPOR (International Society for Pharmacoeconomic and Outcomes Research) guidelines an eQ should deliver data which are comparable to or better than those of a paper questionnaire and measurement of the difference between the 2 data gathering methods is an essential feature of validation.[15] Previous outcomes revealed that eQs have higher or equivalent measures compared to paper questionnaires[16] and eQs are more reliable.[17,18] However, discrepancies between paper and electronic versions of the same questionnaire have also been reported and to date the results have been inconclusive.[19]

In urology there are little to no data on eQs in clinical and research settings. Most previous eQ research was unfriendly, that is it depended on a specific desktop, an unclear display, etc. In contrast, it is common to use an iPad tablet. This tablet is wireless and has a friendly, clear display and answers are entered on a touchscreen. As demonstrated by previous research the potential benefits of eQs can potentially revolutionize the field of urology by improving the quality of care.

Thus, the primary aims of this study were to compare electronic vs paper questionnaires in urology patients with OAB symptoms and then determine whether eQs were at least equivalent to paper questionnaires in the urology clinic setting. We hypothesized that eQs would provide a better or at least an equal clinical experience for patients than paper questionnaires. By studying the effects of electronic questionnaires in clinical settings we thought we could better determine how to improve patient quality of care and satisfaction, and the overall field of urology.

MATERIALS AND METHODS

Study Design

In this study we developed an electronic questionnaire system through the Laborie iList. When completing electronic questionnaires on a touchscreen iPad Wi-Fi A1219 tablet, an interface from the Laborie system is sent to the iList software while another interface from the tablet is sent to the patient electronic medical record. This software enables the patient to answer quality of life questionnaires directly on the tablet while also enabling health care providers to quickly obtain all necessary pretreatment and posttreatment questionnaires through the iList application and analysis.

After receiving University of California-Irvine institutional review board approval 80 patients, including 42 females and 38 males 21 to 87 years old who met inclusion criteria, provided consent and were enrolled in this study between November 2015 and September 2016. Study inclusion criteria were men and women at least 18 years old who could read and speak English, who were experiencing OAB symptoms and who were new patients at our clinic.

We used 2 validated OAB questionnaires, including the PBBC and the OABSS. Patients were randomized into 2 groups. Group 1 patients completed the PPBC questionnaire electronically first and the OABSS questionnaire on paper second. Group 2 patients completed the questionnaires in the reverse order. After that the patients were given feedback forms to assess satisfaction with the electronic questionnaires. Favorability was rated on a scale of 1—much worse, 2—worse, 3—same, 4—better or 5—much better. This patient feedback, which was also based on age, gender, education level and familiarity with using an iPad tablet, will be used for further analysis of the data.

Statistical Analysis

The prespecified primary analyses of patient favorability (preference) of a tablet vs a paper form of the PPBC and the OABSS were based on the 2-sided Z-test to determine whether the proportion of patients who considered the tablet to be the same, better or much better than paper was significantly greater than 50% (null effect). This was our primary hypothesis a priori (before implementation). We repeated the Z-test in patients randomized to the PPBC questionnaire and those randomized to the OABSS questionnaire, considering each group separately to examine whether the preference depended on the specific questionnaire. Similarly patient preferences were analyzed in

stratified groups based on age (65 or younger vs older than 65 years), gender, education (lower/higher than a bachelor's degree) and familiarity with the tablet (very, somewhat and not at all familiar).

All results are reported as point estimates, that is the proportion of patients who considered the tablet to be the same, better or much better than paper, with the 95% CI and the p value. In addition, we used the 2-sided chi-square test to formally assess whether the intervention effect significantly differed among the demographic subgroups.

The sample size/power analysis of this study was based on the 2-sided Z-test of the percent of patients who considered the tablet to be the same, better or much better than paper with significance considered at 0.05. With a sample size of 80 patients the study would have 80% power to determine that the proportion of tablet preference was significantly higher than paper if the observed proportion was at least 0.65 or lower if at most 0.35.

RESULTS

Subject Characteristics

There was a total of 80 patients. Table 1 lists patient demographics. Of the patients 49% were 65 years or younger and 53% were female. Age ranged from less than 39 to 72 years or greater. Of the patients 51% had an education lower than a bachelor's degree. About 38% of the patients reported that they were very familiar with the tablet, 38% reported that they were somewhat familiar and 20% reported that they were not at all familiar.

Prespecified Analyses of Primary Outcome

Overall the percent of patients who considered the tablet to be the same, better or much better than paper was 82.5% (95% CI 74.2–90.8). This was significantly greater than 50% (null effect) at $p < 0.001$ (tables 2 and 3). Of patients who completed the PPBC questionnaire first 80.5% (95% CI 68.4–92.6) considered the tablet to be the same, better or much better than paper ($p < 0.001$). In those who completed the OABSS questionnaire first the results were similar at 84.6% (95% CI 73.3–95.9, $p = 0.001$).

Table 1. *Study subject demographic characteristics*

	No. Pts (%)
Age:	
39 or Less	6 (7.50)
40–51	9 (11.25)
52–71	30 (37.50)
72 or Greater	35 (43.75)
Male	38 (47.50)
Female	42 (52.50)
Education:	
Lower than bachelor's degree	41 (51.25)
Bachelor's degree or higher	39 (48.75)
Tablet familiarity:	
Very	30 (37.50)
Somewhat	30 (37.50)
Not at all	19 (26.4)

Table 2. *Primary outcome frequency overall and by questionnaire*

Outcome	No. Pts (%)	No. PPBC (%)	No. OABSS (%)
Much better	23 (28.75)	11 (26.83)	12 (30.77)
Better	20 (25.00)	8 (19.51)	12 (30.77)
Same	23 (28.75)	14 (34.15)	9 (23.08)
Worse	5 (6.25)	2 (4.88)	3 (7.69)
Much worse	9 (11.25)	6 (14.63)	3 (7.69)

There was no difference in preference between patients who completed the PPBC first and those who completed the OABSS first ($p = 0.63$). Thus, preference for the tablet was similarly high overall and in patients assigned to the PPBC or the OABSS first.

Secondary Analyses of Satisfaction by Demographic Subgroups

Preference for the tablet was significantly higher than the null effect in all demographic subgroups except in patients who reported that they were not at all familiar with the tablet (table 4 and see figure). Specifically the tablet was considered to be the same, better or much better than paper by 76% to 97% of patients in any of the age, gender and education subgroups, and among those who reported that they were very or somewhat familiar with the tablet (each $p < 0.001$). However, only 45% of patients who reported that they were not at all familiar with the tablet considered it to be the same, better or much better than paper. This incidence did not significantly differ from 50% ($p = 0.655$).

Furthermore, satisfaction with the tablet was similarly high in patients who were 65 years old or younger and those older than 65 years ($p = 0.10$) as well as in males and females ($p = 0.70$), and patients with an education lower than a bachelor's degree and those with a bachelor's degree or higher ($p = 0.63$). However, there was a significant difference in the intervention effect between patients who were very or somewhat familiar with the tablet vs those who were not at all familiar with it ($p < 0.001$). Of the respondents 28.85% thought that the eQs were the same as the paper questionnaires while 53.75% responded that the eQs were better (25%) or much better (28.75%) than the paper questionnaires.

DISCUSSION

The results of our study clearly show that our patients found the electronic questionnaires to be

Table 3. *Prespecified analyses of primary outcome overall and by questionnaire ($p < 0.0001$)*

Intervention Effect	No. Pts/Total No.	% (95% CI)
Overall vs null	66/80	82.50 (74.2–90.8)
PPBC	33/41	80.49 (68.4–92.6)
OABSS	33/39	84.62 (73.3–95.9)

Table 4. *Primary outcome secondary analyses by demographic subgroup*

	No. Pts/Total No.	% (95% CI)	p Value
Age:			
65 or Less	35/39	89.74 (80.2—99.3)	<0.0001
Greater than 65	31/41	75.61 (62.5—88.8)	0.0010
Male	32/38	84.21 (72.6—95.8)	<0.0001
Female	34/42	80.95 (69.1—92.8)	<0.0001
Education:			
Lower than bachelor's degree	33/41	80.49 (68.4—92.6)	<0.0001
Bachelor's degree or higher	33/39	84.62 (73.3—95.9)	<0.0001
Tablet familiarity:			
Very	29/30	96.67 (90.2—103.1)	<0.0001
Somewhat	28/30	93.33 (84.4—102.3)	<0.0001
Not at all	9/20	45.00 (23.2—66.8)	0.6547

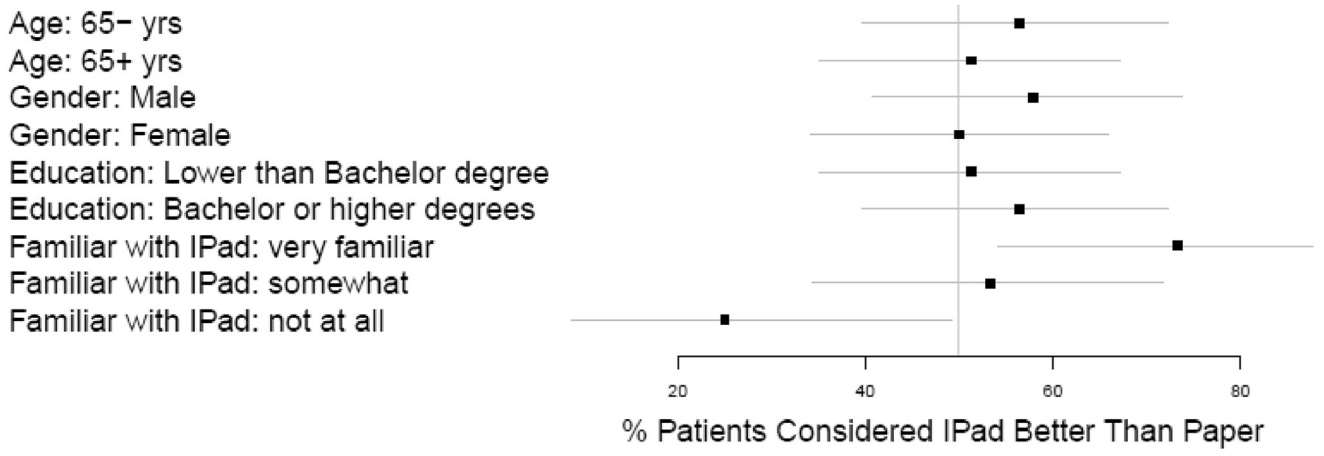
equal to or better than the paper versions. Age, gender and education level did not adversely affect the preference for the electronic questionnaires. The only variable which impacted preference was no prior familiarity with the iPad tablet but even then 45% of this subgroup preferred the electronic version.

The literature supports eQs through work done in other fields. In a study of a large cohort of 10,999 primary care patients 84% found no difficulty in using touchscreen tablets to complete electronic questionnaires.[20] Those with difficulty using tablets trended to be older patients, and patients with comorbidities and an education level below high school.[21] The field of rheumatology has been proactive in incorporating electronic questionnaires.[22,23] Salaffi et al reported that 86% of their cohort preferred electronic over paper questionnaires.[24] In that series mean age was 65 years and 67% of patients had had little to no prior computer experience. Gender was also not a factor in patient preference in that study.

In the oncologic literature Martin et al found that 83% of patients preferred a computer based questionnaire, of whom 71% preferred a tablet over a web based format.[25] Of those patients older than 65 years 66% also preferred a computer based questionnaire. This contrasts with a study of electronic questionnaires used by patients with breast cancer.[26] In that series electronic questionnaires were favored by younger patients with a higher education level. This differs from our findings, which showed that age and education level did not affect the patient preference. We provided a wireless system with portable tablets. No desktop computer was needed. The patient used a touchscreen for responses and no writing utensil. We believe that the ease and feasibility of our system helped increase patient satisfaction.

The integration of eQs into clinical practice has several advantages in addition to patient preference. It allows for immediate data calculation and integration into the electronic health record without the time needed for manual data entry from a paper version as well as a decreased risk of data entry errors.[24] Electronic questionnaires on tablets have also been associated with increased patient compliance by those with full questionnaire completion compared to paper or web based versions.[16,21,24,26,27] Salaffi et al found that patients completed electronic questionnaires more quickly than paper versions, which increases clinical efficiency.[24] Also, decreased variability in reporting has been associated with electronic questionnaires.[28] This has implications for future research endeavors with the possibility of fewer missing data points and faster data collection.

Electronic questionnaires also have the ability to enhance patient-physician communication. They can be completed remotely (eg online) to assess the objective response to treatment between clinic visits. Patients are more involved in their care and progress. Tablet and mobile devices also readily assist providers to maintain medical records and aid in clinical decision making.[25,29] By enhancing patient care with



Tablet preference by demographic subgroup

a new patient centered approach to assessment we suspect that patient compliance with treatment and satisfaction will improve.

Our ultimate goal in the integration of eQs for patient centered health care is to enable patients to be actively involved in their care. Many electronic medical records give the patient the choice to access the chart. We predict a clinical environment in which patients can log in remotely and complete eQs to assess and monitor the response to treatment, allowing providers to treat them using technology. This has the possible effect of eliminating unnecessary clinic visits with obvious health savings. By recording the patient response to treatment in a longitudinal manner we can record the patient perception of treatment with time and adjust as needed. We predict that involving the patient in care will be applied to other chronic disease states in similar fashion, such as benign prostatic hyperplasia.

We acknowledge study limitations. Because our tablets did not have an audio function, literacy in English was required to be part of our study, which eliminated a subset of patients. This may be addressed in the future with improved technological advances to overcome language barriers with translation services as well as aid patients with visual and reading difficulties. In our study patients needed manual dexterity to hold and operate the tablet. We also recognize that the purchase of such tablets in the clinical setting may be a significant upfront cost but with increased clinical efficacy and efficiency it may ultimately decrease the cost of research resources.

CONCLUSIONS

With the increasing integration of technology into personal life and the workplace we found that electronic questionnaires are the patient preferred method to evaluate overactive bladder. They have the possibility of increasing clinical efficiency, improving physician-patient communication and overall improving the patient encounter. They also have implications for improved data collection and research on a larger scale. We hope that integrating eQs into medical practice, specifically in the urological field, will improve overall patient care in the future.

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